University of Gdańsk

Subject card

Subject name and code	Latent Variable and Censored Data Models, PG_00177510		
Field of study	Informatics and Econometrics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	5.0
Learning profile	academic	Assessment form	credit
Conducting unit	Department of Statistics -> Faculty of Management -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Ewa Wycinka	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	4.0	61.0	125

Subject objectives

The aim of the course is to familiarize students with advanced data analysis methods, particularly with hidden variable models and techniques for handling censored data.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[IiEMU2_U01] Can creatively and profoundly analyze complex social and economic processes using structured knowledge, econometrics, informatics, or statistics tools	The student can interpret the results of analyses of hidden variables and censored data and draw conclusions from them.	[SU2] presentation/project/paper/ report
[IiEMU2_U03] Is able to obtain and verify data from properly selected sources and to collect, process, and visualize it using modern econometrics, informatics or statistics tools	The student can identify hidden variables in various research contexts. The student is able to apply appropriate statistical methods to analyze censored data. The student can conduct advanced data analyses using specialized software.	[SU2] presentation/project/paper/ report
[IiEMU2_W06] Possesses a structured understanding of the processes, methods, and tools necessary for the design, creation, development, and provision of suitable conditions for informatics, econometrics or statistics tools	The student knows the basic concepts and definitions related to hidden variable models and censored data. The student understands the theoretical foundations and assumptions of hidden variable models and methods for analyzing censored data.	[SW2] presentation/project/paper/ report

Subject contents	1. Introduction to censored data. Definition of censored data. 2. The essence of survival analysis (event history analysis) and examples of its applications in various fields (medicine, engineering, economics). 3. Duration (time-to-event) as a random variable. Estimators of the survival function for censored data (Kaplan–Meier estimator, Nelson–Aalen estimator). Statistical tests in the analysis of censored data. 4. Regression models in event history analysis: the Cox proportional hazards model. Explanatory variables in regression models (coding methods, functional forms of variables). Verification of the assumptions of the Cox model (assessment of proportional hazards, residual analysis). Model goodness-of-fit assessment. 5. Time-dependent variables. 6. Accelerated failure time (AFT) models. Basic assumptions of AFT models. Comparison with proportional hazards models. Definition of the hazard function in the context of AFT models. Survival function and its estimation. Parameterization of AFT models. Parameterization of distributions (e.g., Weibull distribution, log-logistic distribution). Methods of parameter estimation. Incorporating time-dependent variables in AFT models. Diagnostics of AFT models. Checking AFT model assumptions. Examples of applications of AFT models in various fields (medicine, economics, engineering). 7. Unobserved (latent) variables in substantive theory. Latent variables as theoretical constructs and their measurement. Examples of applications in various fields (psychometrics, sociology, economics). 8. Structural equation models (SEM) as a tool for testing substantive theories and exploring relationships. 9. Specification and identification of SEM models: path analysis and systems of structural equations. 10. Confirmatory factor analysis (CFA): relationships between latent variables (factors) and observed variables (indicators). 11. The SEM model as a combination of a structural model and a measurement model. 12. Estimation of model parameters and evaluation of the SEM model. 13. Interpretation of the SEM model: direct, indirect, and total effects.
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
project 1	51.0%	50.0%
project 2	51.0%	50.0%

Recommended reading	Basic literature	Wycinka E., Modele zdarzeń konkurujących i ich zastosowania w ocenie ryzyka niewypłacalności pożyczkobiorcy, Wyd. UG 2019 (rozdziały 1.1-1.3; 2.1-2.3) Balicki A., Analiza przeżycia i tablice wymieralności, PWE, Warszawa 2006; Stanisz A., Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny. Tom 3. Analizy wielowymiarowe, Rozdział 8, Statsoft Polska, Kraków 2007 Konarski R., Modele równań strukturalnych, PWN, Warszawa 2009 Collins, L. M., & Lanza, S. T. (2010). Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences. Wiley.

	Supplementary literature	Frątczak E.Gach-Ciepiela U., Babiker H., Analiza historii zdarzeń, SGH Warszawa 2005; Jurkiewicz T., Wycinka E., Significance tests of differences between two crossing curves for small samples, Acta Universitatis Lodziensis, Folia Oeconomica 255, 2011, s. 107-114 Jackowska B., Modele dalszego trwania życia oraz ich zastosowania w przypadku osób starszych, Wyd. UG 2013 Klein J.P., Moeschberger M.L., Survival Analysis Techniques for Censored and Truncated Data, Springer-Verlag, 2003 Kleinbaum D., Klein M., Survival Analysis. A Self-Learning Text, Third Edition 2012 Byrne B.M., Structural Equation Modeling with AMOS: Basic concepts, applications, and programming, Routledge/Taylor & Francis, New York 2016 Collins, L. M., & Lanza, S. T. (2010). Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences. Wiley. Lee, S. Y. (2007). Handbook of Latent Variable and Related Models. Elsevier.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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